

# Congenital Adrenal Hyperplasia (CAH)

Congenital Adrenal Hyperplasia (CAH) is a family of [autosomal recessive disorders](#) characterized by the inability to synthesize cortisol, and in most instances, also the inability to synthesize the salt-retaining hormone, aldosterone. The most common form of CAH (more than 90% of cases) is caused by a [deficiency of the adrenal enzyme 21-hydroxylase \(21-OH\)](#) and is identified by assessing the level of 17-alpha-hydroxyprogesterone (17-OHP) in blood. Depending on the extent of the enzyme deficiency, the disorder presents as either a salt-losing form (75% of cases), or a non-salt-losing form. CAH is the most common cause of ambiguous genitalia in females, and can cause acute life-threatening adrenal crisis in both males and females in the neonatal period.

The State of Missouri newborn screening test is for the 21-OH form of CAH. Screening is based on an immunoassay for the precursor steroid, 17-alpha-hydroxyprogesterone (17-OHP), the metabolic product just prior to the cortisol synthesis step. The levels of 17-OHP are generally elevated in both salt-losing and non-salt-losing forms of 21-OH CAH.

**Prevalence:** 1: 15,000

**Analyte Measured:** 17  $\alpha$ -hydroxyprogesterone (measured in ng/ml)

**Reporting Ranges:** Reporting ranges are weight dependent:

Weight (gms)	17-OHP Results (ng/ml)	Result
≤ 1249	<150	Normal
	150 - 249	Borderline Risk
	≥ 250	High Risk
1250 - 1749	< 115	Normal
	115 - 149	Borderline Risk
	≥ 150	High Risk
1750 - 2249	< 80	Normal
	80 - 134	Borderline Risk
	≥ 135	High Risk
≥ 2250	< 65	Normal
	65 - 99	Borderline Risk
	≥ 100	High Risk

**Feeding Effect:** None

**Timing Effect:** False positive 17-OHP results may occur if sample is collected before 24 hours of age.

**Premature infants:** Because the immature adrenal gland sustains increased plasma concentrations of most adrenal metabolites, including those measured to detect CAH, elevated levels of 17-OHP may normally be detected in premature infants. Additionally, the stress of illness commonly experienced by premature infants also stimulates adrenal steroid production. Cross reactivity with other precursor hormones present in premature infants may also cause false positive results.

**Confirmation:**

**High Risk:** 17-OHP results in the **High Risk** range should be considered a medical emergency until the patient has been evaluated to confirm or rule out the diagnosis of salt-wasting CAH. Confirm with serum/plasma 17-OHP, and if salt wasting is suspected, sodium, potassium, CO<sub>2</sub>/bicarbonate and glucose. Be alert for possible symptoms of salt-wasting CAH: poor feeding, lethargy, vomiting, dehydration, hypotension and ambiguous genitalia.

Consult with a pediatric endocrinologist.

**Borderline Risk:** 17-OHP results in the **Borderline risk** range should be followed up promptly with a repeat newborn screen or with a serum 17-OHP. If clinical symptoms of salt-wasting CAH are present, consult with a pediatric endocrinologist and confirm with serum testing. Elevations in 17-OHP may be present if sample is collected early in life and/or in premature, sick infants.

**Treatment:** A pediatric endocrinologist should make salt-wasting and non salt-wasting CAH diagnosis and treatment.

**Comment:** The screening test for CAH is meant to identify infants at risk and in need of diagnostic testing. A "normal" screening result does not rule out the possibility of a "non-salt wasting" form of CAH, a mild form of 21-hydroxylase deficiency CAH, or other forms of CAH.

**Considerations:**

- Hormone (steroid) therapy administered to the mother during pregnancy, or to the infant immediately after birth, can interfere with CAH test results.
- Premature or sick infants may have a false-positive screen due to increased stress on the body.
- Specimens collected prior to 24 hours of age may exhibit a false positive or false negative result. It is extremely important to perform a second screening on these infants as soon as possible to ensure that the infant whose 17-OHP level has not stabilized, and is continuing to rise, is not missed. A small percent of infants will be detected only on a second screen.
- Blood collection with preservatives (EDTA) can result in false positive results.
- CAH ranges apply to the newborn period. Interpretation of results from specimens collected after the newborn period should be performed in consultation with a pediatric endocrinologist.
- INFANTS WITH CAH MAY NOT APPEAR ILL AT BIRTH, BUT MAY EXPERIENCE A SALT-LOSING CRISIS WITHIN THE FIRST FEW WEEKS OF LIFE, WHICH CAN LEAD TO SERIOUS ILLNESS AND DEATH.

**Reference and Support Groups:**

Congenital Adrenal Hyperplasia Education and Support Network

Website: [www.congenitaladrenalhyperplasia.org](http://www.congenitaladrenalhyperplasia.org)

Congenital Adrenal Hyperplasia Research, Education and Support Foundation (CARES)

11 Hardwell Road, Short Hills, NJ 07078

Phone: 1-866-227-3737

Website: [www.caresfoundation.org](http://www.caresfoundation.org)

MAGIC Foundation for Children's Growth

1327 North Harlem Avenue, Oak Park, IL

Phone: 1-800-362-4423

Website: [www.magicfoundation.org](http://www.magicfoundation.org)

National Adrenal Diseases Foundation (NADF)

505 Northern Blvd., Great Neck, NY 11021

Phone: 516-487-4992

Website: <http://www.nadf.us>

The John Hopkins Children's Center

Website: [www.hopkinsmedicine.org/pediatricendocrinology/cah/](http://www.hopkinsmedicine.org/pediatricendocrinology/cah/)